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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/754,013	01/05/2004	Byoung-Ho Lee	2522-049	7107

20575 7590 11/02/2007

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EXAMINER	
NEWMAN, MICHAEL A	

ART UNIT	PAPER NUMBER
2624	

MAIL DATE	DELIVERY MODE
11/02/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/754,013	LEE ET AL.	
	Examiner	Art Unit	
	Michael A. Newman	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment received on August 31st, 2007 has been entered.

Response to Arguments

2. Applicant's arguments, see Remarks pages 8 - 11, filed August 31st, 2007, with respect to the rejection(s) of claim(s) 1, 15 and 29 under 35 USC 102 have been fully considered and are persuasive. Therefore, the rejections have been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of newly found prior art.

Double Patenting

3. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

Claims 15 - 28 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1 – 27 of copending Application No. 10/749,670. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26 and 28 are rejected under 35 U.S.C. 102(e) as being anticipated by Noguchi et al. (U.S. Patent No. 7,037,735).

a. Regarding claims 15 and 23, Noguchi teaches a method and apparatus for detecting a defect on a substrate, the apparatus comprising: a support for supporting a substrate **(Noguchi Fig. 3 element 304)**, wherein the substrate has a plurality of device units with a same pattern formed on a surface of the substrate and each device unit includes a plurality of pixels **(Noguchi Figs. 27a and b – Col. 37 lines 36 – 48)**; a light source for irradiating a light on the substrate **(Noguchi Fig. 3 element 101)**; an image detector for sensing light reflected by a surface of the substrate from the light source **(Noguchi Fig. 3 element 205)**, wherein the image detector generates analog image data for each pixel of each device unit; an analog-to-digital converter for converting the analog image data to digital image data **(Noguchi Fig. 4 element 401 - Col. 14 lines 63 – 67)**; a data processing unit for forming first differential image data of a target pixel by subtracting the digital image data of a corresponding pixel from the digital image data of the target pixel **(Noguchi Col. 38 lines 45 – 46)**, the target pixel being a subject pixel for detecting a defect, and the corresponding pixel being a neighboring pixel that is positioned in a first device unit adjacent to a

second device unit including the target pixel and that corresponds to the target pixel **(Noguchi Col. 37 lines 36 – 44)**; a reference setting unit for setting a threshold value **(Noguchi Col. 38 lines 53 – 55)** and a reference size range **(Noguchi Col. 45 lines 6 – 11)**, the threshold value being compared with the first differential image data **(Noguchi Col. 38 lines 47 – 52)** and the reference size range being compared with a defect size corresponding to a specific defect **(Noguchi Col. 45 lines 17 – 21)**; and a checking unit for checking a defective pixel, whereby the first differential image data becomes second differential image data of the target pixel if the first differential image data is greater than the threshold value **(Noguchi Col. 40 lines 46 – 51)**, and the second differential image data of the target pixel becomes third differential image data of the target pixel, if the second differential image data of the target pixel is within the reference size range **(Noguchi Col. 45 lines 12 – 14) [Note that each time the reference dimensions are changed, a new output is generated]**, the checking unit checking the target pixel corresponding to the third differential image data as the defective pixel **(Noguchi Col. 45 lines 29 – 35)**.

b. Regarding claims 16, 22 and 24, Noguchi further teaches that the substrate includes a wafer for fabricating a semiconductor device and the device unit further comprises a unit cell operating as an independent electronic circuit on the wafer **(Noguchi Col. 13 lines 40 – 43 and Col. 41 lines 14 – 16)**.

c. Regarding claims 17, 18, 25 and 26, Noguchi further teaches that the irradiating light includes a short-wave light and specifically ultraviolet light **(Noguchi Col. 34 lines 26 – 27)**.

d. Regarding claim 19, Noguchi further teaches that the image data includes binary digital data **(Noguchi Col. 26 line 61 – Col. 27 line 4)**.

e. Regarding claims 21 and 28, Noguchi further teaches displaying the defective pixel and a defect image on a monitor **(Noguchi Col. 40 lines 51 – 57)**.

Claim Rejections - 35 USC § 103

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 29, 31, 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi et al. (U.S. Patent No. 7,037,735) in view of Hung et al. (U.S. Patent No. 7,162,071). Hereinafter referred to as Noguchi and Hung respectively.

a. Regarding claims 1 and 29, Noguchi teaches a method and apparatus for detecting a defect on a substrate, the apparatus comprising: a support for supporting a substrate **(Noguchi Fig. 3 element 304)**, wherein the substrate has a plurality of device units with a same pattern formed on a surface of the substrate and each device unit includes a plurality of pixels **(Noguchi Figs. 27a and b – Col. 37 lines 36 – 48)**; a light source for irradiating a light on the

substrate **(Noguchi Fig. 3 element 101)**; an image detector for sensing light reflected by a surface of the substrate from the light source **(Noguchi Fig. 3 element 205)**. Noguchi further teaches a reference-setting unit for setting a threshold value **(Noguchi Col. 38 lines 53 – 55)**, and comparison units to determine defective pixels based on the thresholds **(Noguchi Col. 38 lines 47 – 52)**. However, **Noguchi fails to teach** that the threshold value is digital image data of a specific defect, and a marking unit for marking a pixel as defective when the digital image data of the pixel is substantially identical to the threshold value. **Pertaining to the same field of endeavor, Hung teaches a self-learning defect classification system. Specifically, Hung teaches extracting image of a wafer (Hung Col. 2 lines 65 to 67), matching its contents with a dynamic library of previously obtained defect images to find defects (Hung Col. 8 lines 34 – 67) and classifying the defect based on its resemblance to the reference defect images. Furthermore, Hung teaches that such a defect automatic detection/classification system reduces an operator's loading time and accelerates the timing of the classification (Hung Col. 3 lines 61 – 63). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Noguchi's pixel-to-pixel comparison with a collection of known defect images, as taught by Hung, in order to not only detect defects, but also speedily classify them to determine the most appropriate corrective action.**

b. Regarding claims 2 and 14, Noguchi further teaches that the substrate includes a wafer for fabricating a semiconductor device and the device unit further comprises a unit cell operating as an independent electronic circuit on the wafer **(Noguchi Col. 13 lines 40 – 43 and Col. 41 lines 14 – 16)**.

c. Regarding claims, 3 and 4, Noguchi further teaches that the irradiating light includes a short-wave light and specifically ultraviolet light **(Noguchi Col. 34 lines 26 – 27)**..

d. Regarding claim 5, Noguchi further teaches that the image data includes binary digital data **(Noguchi Col. 26 line 61 – Col. 27 line 4)**.

e. Regarding claims 6, 7 and 30, Noguchi further teaches that the binary digital data represents a level on a gray scale **(Noguchi Col. 44 line 20 – 25)**. Noguchi doesn't explicitly state that the gray scale is distinguishable by a relative density of black and white. However, **official notice is taken** that it is old and extremely well known in the art that grayscale images are composed of shades of gray, varying from black to white and are commonly represented in 256 quantized steps or levels when using common 8-bit processors and memory components.

f. Regarding claim 8, Noguchi, as modified by Hung with regards to claim 1 above, also teach that forming second image data of a specific defect comprises observing the substrate surface **(Hung Col. 2 lines 33 – 37)**.

g. Regarding claims 8 and 9, Noguchi further teaches observing the substrate surface comprises using an optical or electromagnetic instrument

including a scanning electron microscope (SEM) **(Noguchi Col. 55 lines 15 – 19)**.

h. Regarding claims 11 and 12, Noguchi teaches that an upper (positive) and lower (negative) threshold are required to compare the pixel differences between the first and second images **(Noguchi Col. 38 lines 45 – 52)**. Although, Noguchi does not explicitly state that the second image data includes a range defined by upper and lower limits; it would be clear to one of ordinary skill in the art that requiring a positive and negative threshold, indicates an expectation of—at least—an inspected image with a range of (grayscale) values. Additionally, as modified by Hung, the reference defect images are obtained by the same means as the inspected image **(Hung Col. 2 lines 33 – 37)**. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the reference defect (second) image would include a range of binary digital grayscale values.

i. Regarding claims 13 and 31, Noguchi further teaches displaying the defective pixel and a defect image on a monitor **(Noguchi Col. 40 lines 51 – 57)**.

j. Regarding claim 32, Noguchi further teaches that the image detector generates analog image data for each pixel of each device unit, further comprising an analog-to-digital converter for converting the analog image data to digital image data **(Noguchi Fig. 4 element 401 - Col. 14 lines 63 – 67)**.

8. Claims 20 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi et al. (U.S. Patent No. 7,037,735).

a. Regarding claims 20 and 27, Noguchi teaches all the limitations of dependent claim 19 and independent claim 23, respectively, as set forth in the 102 rejection of claims 19 and 23 above. Noguchi further teaches that the binary digital data represents a level on a gray scale **(Noguchi Col. 44 line 20 – 25)**. Noguchi doesn't explicitly state that the gray scale is distinguishable by a relative density of black and white. However, **official notice is taken** that it is old and extremely well known in the art that grayscale images are composed of shades of gray, varying from black to white.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Young et al. (U.S. Patent No. 4,870,357) teaches an LCD display pixel defect detection system by comparing two images of the display surface with difference illumination.

b. Maayah et al. (U.S. Patent No. 7,065,239) teaches a system for defect inspection in wafers including flat panel displays by differentiating between repetitive and non-repetitive patterns.

c. Yang et al. (U.S. Pg Pub No. 2003/0215129) teaches a micro-display evaluation system in which error detection is carried out at the sub-pixel level using electro-optical response measurements.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael A. Newman whose telephone number is (571) 270-3016. The examiner can normally be reached on Mon - Thurs from 9:30am to 6:30pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir A. Ahmed can be reached on (571)272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

M.A.N.

SAMIR AHMED
SUPERVISORY PATENT EXAMINER